REMARKS

In response to the Office Action dated February 23, 2005, claims 28 and 29 have been amended. Therefore, claims 1-37 remain in the case. In light of the amendments and arguments set forth herein, reexamination and reconsideration of the application are requested.

Section 102(b) Rejections

The Office Action rejected claims 1-37 under 35 U.S.C. § 102(b) as being anticipated by Deering (U.S. Patent No. 6,169,554). The Office Action stated that Deering discloses each and every element of the Applicants' claimed invention.

In response, the Applicants respectfully traverse these rejections based on the amendments to claim 28 and the following legal and technical analysis.

In general, the Applicants submit that Deering lacks at least one material claimed feature of the Applicants' claimed invention. In particular, for independent claims 1, 10 and 18, Deering lacks the material claimed feature of "converting rendering data from a first format into a variable-length fixed-point format." For independent claim 23, Deering lacks the material claimed feature of "generating rendering data is a normalized homogeneous coordinate system (NHCS) fixed-point format." For independent claim 28, Deering lacks the material claimed feature of "a variable-length fixed-point format."

Independent Claims 1, 10, 18, 23 and 28

Independent claim 1 of the Applicants' claimed invention includes a computer-implemented method for rendering graphics on an embedded device. The method includes inputting rendering data in a first format, and converting the rendering data from the first format into a variable length fixed-point format. In addition, the method includes processing the rendering data in the variable-length fixed-point format, and rendering the processed rendering data on the embedded device.

Independent claim 10 of the Applicants' claimed invention includes a process for rendering graphics on an embedded computing platform. The process includes inputting rendering data, and converting the rendering data into a variable-length fixed-point format including a normalized homogenous coordinate system (NHCS) for vector operations. The process further includes defining a data structure for the converted rendering data to generate converted rendering data in a NHCS fixed-point format, using a fixed-point mathematical library to process the NHCS fixed-format rendering data, and rendering the processed NHCS fixed-format rendering data on the embedded computing platform.

Independent claim 18 of the Applicants' claimed invention includes a computer-readable medium having computer-executable instructions for preparing data for rendering on a computing device. The instructions include converting the data into a variable-length fixed-point format having a normalized homogenous coordinate system (NHCS) to generate NHCS fixed-point data, and creating specialized buffers on the computing device to store the NHCS fixed-point data. The instructions also include processing the NHCS fixed-point data using a mathematical library capable of computing mathematical operations and graphics functions using a NHCS fixed-point format, and preparing the processed NHCS fixed-point data for raster by translating the NHCS fixed-point data into a language of the computing device's graphics hardware.

Independent claim 23 of the Applicants' claimed invention includes a method for converting a format of rendering data. The method includes inputting the rendering data in at least one of the following formats: (a) floating-point format; (b) fixed-point format, and identifying a maximum value in the rendering data. In addition, the method includes normalizing remaining values in the rendering data based on the maximum value to generate the rendering data in a normalized homogenous coordinate system (NHCS) fixed-point format.

Amended Independent claim 28 of the Applicants' claimed invention includes a graphics rendering system for an embedded computing device. The system includes a task module that inputs raw rendering data in a first format and converts the raw rendering

data into a second format that is a variable-length fixed-point format. The system further includes an application programming interface (API) module that creates buffers for storing the converted rendering data, a driver module that processes the converted rendering data to prepare the converted rendering data for rendering, and a rendering engine that renders the processed rendering data on the embedded computing device.

The Applicants' claimed invention using and converting incoming data into a variable fixed-point format. A variable fixed-point format "is a way to represent a floating-point number using integers" (specification, page 22, lines 10-12). Because "most floating point software routines are quite slow", the fixed-point format "is a much faster way to handle calculations" (specification, page 22, lines 23-24). In other words, "[F]ixed-point number representation is a way to speed up any program that uses floating point" (specification, page 22, lines 26-27). In a preferred embodiment, the Applicants' claimed invention converts incoming data in a floating-point format into a normalized homogeneous coordinate system (NHCS) fixed-point format (specification, page 23, lines 10-15). Thus, the Applicants' claimed invention uses "fixed-point operations instead of floating-point operations" (specification, page 3, lines 15-16).

In contrast, Deering merely discloses a hardware clipping with a guard-band technique that uses a floating-point homogeneous coordinate format. Specifically, a clip testing unit includes a coordinate input register for receiving a vertex position (col. 2, lines 59-61). The vertex position is represented in homogeneous coordinates, and has a corresponding W value (col. 2, lines 61-63). The clip testing unit also includes a W input register that receives and stores the W value, and a guard band W generation unit that is coupled to the W input register to generate a guard band W value in response to the W value (col. 2, lines 63-67).

The clip testing unit also includes a clip compare unit that is coupled to the W input register, the guard band W register, and the coordinate input register (col. 3, lines 4-6). The clip compare unit receives and compares the W value and a given coordinate value (col. 3, lines 6-8). This generates one or more first clip signals (col. 3, lines 8-9). The clip

compare unit also receives and compares the guard band W value and the value of the given coordinate (col. 3, lines 12-14). This generates one or more second clip signals (col. 3, lines 14-15).

The first clip signals indicate whether the value of a given coordinate is outside of regular clipping space, as defined by the regular clipping planes (col. 3, lines 9-12). The second clip signals indicate whether the value of a given coordinate is outside of a guard band clipping space, as defined by the guard band clipping planes (col. 3, lines 15-18).

All operations described in Deering are performed using a floating-point homogeneous coordinate format. In particular, "[R]eceived geometric primitives are then transferred to floating point blocks 152 for a variety of operations, including transformation, clip testing, lighting and set-up" (col. 6, lines 18-21; emphasis added). These floating point blocks 152 are also called "floating point processors 152", and are part of an "F-core block 352", shown in FIG. 6 (col. 8, lines 38-40). "Before processing by subsequent pipeline stages, these coordinates first undergo a view transformation operation, performed in F-core block 352" (col. 11, lines 5-7). Thus, all operations, including view transformations, are performed in a floating-point format.

Thus, while Deering merely discloses using a floating-point format, the Applicants' claimed invention in independent claims 1, 10, 18, 23 and 28 uses a variable length fixed-point format. Nowhere does Deering disclose using the Applicants' claimed variable length fixed-point format. Because Deering is missing at least this material claimed feature of the Applicants' claimed invention, the §102 rejection of independent claims 1, 10, 18, 23 and 28 cannot stand.

Accordingly, the Applicants respectfully submits that independent claims 1, 10, 18, 23 and 28 are patentable under 35 U.S.C. § 102(b) over Deering based on the amendments to claim 28 and the legal and technical arguments set forth above and below. Moreover, claims 2-9 depend from independent claim 1, claims 11-17 depend from independent claim 10, claims 19-22 depend from independent claim 18, claims 24-27

depend from independent claim 23, and claims 29-37 depend from amended independent claim 28 and also are patentable over Deering (MPEP § 2143.03). The Applicants, therefore, respectfully request reexamination, reconsideration and withdrawal of the rejection of claims 1-37 under 35 U.S.C. § 102(b) as being anticipated by Deering.

In view of the amendments and arguments set forth above the Applicants submit that claims 1-37 of the subject application are in immediate condition for allowance. The Examiner, therefore, is respectfully requested to withdraw the outstanding rejections and of claims 1-37 and to pass each of the claims to issue.

In an effort to expedite and further the prosecution of the subject application, the Applicants kindly invite the Examiner to telephone the Applicants' attorney at (805) 278-8855 if the Examiner has any comments, questions or concerns, wishes to discuss any aspect of the prosecution of this application, or desires any degree of clarification of this response.

Respectfully submitted,
Dated: May 11, 2005

Craig S. Fischer
Registration No. 42,535
Attorney for Applicants

LYON & HARR, L.L.P.
300 East Esplanade Drive, Suite 800
Oxnard, CA 93036-1274
Tel: (805) 278-8855
Fax: (805) 278-8064